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Fall 2021

PHYS 121-005: Physics II

George Georgiou

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Georgiou, George, "PHYS 121-005: Physics II" (2021). *Physics Syllabi*. 350.
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CLASS SCHEDULE:

Phys 121, Section 005

Day and Time: WF 1-2:20

Room: Culimore 110

Instructor Information

Dr. George E. Georgiou

207 Microelectronics

georgiou@njit.edu (best contact method)

Office Hours: WF11:30-12:30, after class or by appointment (send email)

General Information

- Description: Physics 121 is a calculus-based introduction to electricity and magnetism, emphasizing fundamental concepts and applications. It is the second course in a three-course sequence.
- Pre-requisites (all with grade of C or better): Physics 111 or 111H, and Math 111 or 111H.
- Co-requisites: Physics 121A (the lab course) and Math 112 (Calculus-II).
- Physics 121A Laboratory must be taken along with Physics 121 unless it has been passed previously. A student who drops Physics 121 automatically drops the lab (and vice versa, no exceptions). Physics 121A is otherwise a totally separate course from Physics 121 in that the lab instructors set the requirements and grades. The lab manual (Physics 121A Laboratory Manual 9th Edition) can be purchased at the NJIT bookstore. The most up-to-date lab schedule will be posted at <https://centers.njit.edu/introphysics/welcome>.

Learning Expectations, Goals, Outcomes

Students will be expected to demonstrate understanding and mastery of calculus-based classical electricity and magnetism up to AC circuits, not including Maxwell's Equations or beyond. The topics covered include electric charge, electric and magnetic fields, forces on stationary and moving charges and currents due to electrostatic and magnetic fields, electrostatic potential and potential energy, Gauss' Law, capacitance, current, resistance, DC circuits, the Biot-Savart Law, Ampere's Law, Faraday's Law, inductance, RC circuits, LR circuits, LCR circuits, AC circuits including "phasor diagrams" and resonant oscillations.

In any/all of the above subject areas, students should be able to do the following:

- Recall and use the conceptual and mathematical definitions and be able to explain them.
- Understand the conceptual and mathematical relationships between quantities used.
- Explain and manipulate equations and techniques developed in the text, lectures, problem examples, and in the course of working problems.
- Use symmetry arguments, sketches and diagrams, graphs, algebra, trigonometry, and basic integral and differential calculus methods for reasoning about nature and in setting up and solving textbook-level problems.

- Critically evaluate the soundness and precision of their own reasoning and answers, explain and interpret their solutions to problems in a way that shows understanding, and identify and appraise the range of applicability of their results, and state the limitations of their solutions.
- Apply the skills above to successfully solve textbook-level problems with numeric, symbolic, or conceptual answers.

Learning outcomes are assessed by means of 3 common exams, a final exam, scores on homework assignments, in-class quizzes, and class participation scores.

Materials for Physics 121

- **Textbook (Abbreviation: Y&F): “University Physics”, 15th Edition, authors Young & Freedman (Pearson, 2020). We use Chapters 21 to 31 in Volume 2.** Most students now buy the e-text, which is bundled with the Modified Mastering Physics homework system. The ISBN is 978-0135159552. Students may also use the old 13th and 14th editions of the same text for reading assignments, as the sections numbers match. The end-of-chapter problems are numbered differently. Many students are comfortable using only the e-text.
- **Mastering Physics Online Homework System:** Each student must obtain an access code kit that allows access to the online homework system specifically for the 15th edition of “University Physics”. In addition to having a valid access code, each student must enroll in the Mastering Physics (MP) “course” for his/her Physics 121 section using a course identifier code supplied by each instructor.
- Homework assignments will be posted on-line in Mastering Physics and will be automatically graded. Specific Information for the **Pearson Mastering (PM)** homework system are as follows:

You first create an account on the PM platform and then need a valid Pearson Mastering access code to sign up for the course.

The pearsonmastering.com homework course ID is: georgiou62180 (MPGEORGIU121F21)

For your own reference, record the unique course identifier announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

- NJIT Canvas System: lecture notes, problems, grades, etc. are posted on Canvas (PHYS 121 **Section number**). So check there often.

Grading

Final Letter Grades will be based on a **term average** for the semester’s work that includes the three common exam scores, the final exam, the term’s homework score, in-class quiz scores, and participation measures for attendance. Here are the approximate weights to be used for calculating term averages:

Final Letter Grades: Here are the approximate weights to be used for calculating the composite score:

- **48%** for all three common exams (16% each)
- **32%** for the final exam
- **10%** for the total of homework work
- **10%** for the in-class participation (in-class quizzes)

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
> 85%	A
75 - 85	B+
65 - 75	B
56 - 65	C+
50 - 56	C
45 - 50	D
< 45	F

Final grades are not negotiable: A score of 84.99% is a B+, not an A.

Examinations

There will be three Common Exams plus a comprehensive Final Exam. The schedule is:

- **Common Exam 1:** Monday, September, 27, 2021 4:15 -- 5:45 PM
- **Common Exam 2:** Monday, October, 18, 2021 4:15 -- 5:45 PM
- **Common Exam 3:** Monday November, 22, 2021 4:15 -- 5:45 PM
- Comprehensive Final Exam after December 14, 2.5 hours long

The final exam will emphasize the work covered after common exam 3, but also re-caps the whole course.

Note: Common Exams and Final Exam are all going to be Multiple-Choice questions. Students are going to submit exam questions and scantron cards to be collected at the end of each exam. There is not going to be any partial credit for multiple-choice questions, however students are required to show work to support their answers.

In-class quizzes covering the preceding or current work may be given during lectures and/or recitations. Those scores count toward your final course grade. **There are no make-ups for in class activities.** Students missing a quiz will receive a grade of zero for that item.

I WILL NOT USE iCLICKERS. Periodic in-class quiz will be used to monitor student understanding and attendance.

Missed Exams

Students who miss a common exam will receive a score of zero for that exam unless they present a valid excuse within 7 days of the exam. Students expecting to be absent from a common exam should discuss their situation with their instructor PRIOR TO their absence. Students who miss

two or more common exams automatically fail the course unless they have acceptable excuses. In order to qualify for a (rare) "make-up" common exam a student needs to document the reason for not being able to take the test as scheduled (due for example to an exam conflict or documented illness). NJIT policy requires the documentation to be presented to a student's Physics 121 instructor AND to the Dean of Students, both of whom must agree to permit a "make-up" exam. Conflict common exams are usually held from 6:00 to 7:30 PM on exam days; contact Ms. Oertel (christine.a.oertel@njit.edu) for arrangements.

Course Policies

Honor Code Violations or Disruptive Behavior: NJIT has a zero-tolerance policy for cheating of any kind and for disruptive student behavior. Violations will be reported to and judged by the Dean of Students. The penalties range from failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable.

- Students are required to agree to the NJIT Honor Code on each exam.
- Turn off all phones, wireless devices, laptops, and messaging devices of all kinds during classes and exams.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.
- Needless to say, do not contact any "tutoring services" for help during or preceding an exam.

Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) is excessive. If you have excusable absences contact your instructor or the Dean of Students (973.596.3466, Room 255 Campus Center). Students may sign in only for themselves on attendance sheets; do not sign in for absent students.

Withdrawal: If you must withdraw from the course, do it officially through the Registrar before the last withdrawal date. If you simply stop attending and taking exams your instructor will have to assign a failing grade in the course.

Course Work

The Class Schedule (see below) lists the topics covered, text readings, and homework assignments, exam dates, etc. week by week throughout the term. Some details may be subject to change depending on the class schedule. Be sure to do the homework problems: it is almost impossible to succeed in physics courses without working a lot of problems. It will not help to use someone else's solutions. It can help to form study groups so long as each group member participates in real discussion and independent thought.

Each weekly work unit starts with a lecture and includes a related homework assignment. Some of the homework problems will usually be covered in recitation class and the final HW submit deadline is typically about a week after material is introduced in lecture class.

- Read the assigned sections of the text before the lecture covering that material.
- Read the instructor's lecture notes before class (if provided) and bring them to class.
- Work on homework problems before they are covered in recitation and certainly before they are due. Homework after the due date will not be accepted.
- The Mastering Physics online system shows the applicable homework due dates and keeps track of scores.

Class Participation: Students are expected to initiate and participate in class discussions by asking and answering questions, doing quizzes, working actively with others during in-class group assignments. When students participate in an active learning environment they become more engaged, learn more, enjoy the course more, and have better success in the course.

Help: If you are having trouble in this course visit or email your instructor; do not simply hope for a miracle and fall further behind. All instructors hold office hours (see above) and will also meet with students at other mutually convenient times.

The Physics Dept. office on the 4th floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

Academic Support and Students Affairs, Academic Advising Centers: These organizations assist students who need to make academic decisions, sometimes needing support to progress toward successful graduation.

Physics 121 (Section 05) Class Schedule for Fall 2021

Topic	Text Studies	Notes
Week 01 (9/1, 9/3) Vectors, Intro to Fields	Chapt. 21	Instructor Notes Sec. 21.1 – 3
Week 02 (NO CLASS 9/8 M schedule) (9/10, 9/15) Electric Charge & Force	Chapt. 21	Sec. 21.4 – 7
Week 03 (9/17, 9/22) Gauss' Law	Chapt. 22	Sec. 22.1 – 5
Week 04 (9/24, 9/29) Electric Potential	Chapt.23	Sec. 23.1 – 5
Week 05 (10/1, 10/6) Capacitance	Chapt.24	Sec. 24.1– 6
Common exam 1 – 09/27		Covers Vectors & Fields + Ch. 21 + Ch. 22
Week 06 (10/8, 10/13) Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules	Chapt.25 & Chapt. 26	Sec. 25.1 - 5, Sec. 26.1 – 2
Week 07 (10/15, 10/20) Multi-loop and RC Circuits	Chapt.26	Sec. 26.2 – 5
Week 08 (10/22, 10/27) Charges & Currents in Magnetic Fields	Chapt. 27	Sec. 27.1 – 8
Common exam 2 – 10/18		Covers Chapters 23, 24, 25
Week 09 (10/29, 11/3) Sources of Magnetic Field. The Biot-Savart Law, Amperes Law	Chapt.28	Sec. 28.1- 7
Week 10 (11/5, 11/10) Faraday's Law of Induction	Chapt. 29	Sec. 29.1 – 5

Week 11 (11/12, 11/17) Inductance, RL Circuits	Chapt. 30	Sec. 30.1 – 4
Common exam 3 – 11/22		Covers Chapters 26, 27, 28
Week 12 (11/19, 11/24) LC & LRC Circuits, EM Oscillations, AC Circuits	Chapt. 30 & Chapt. 31	Sec. 30.5 - 6 Sec. 31.1 – 2
Week 13 (12/1, 12/3) AC Circuits, Resonance	Chapt.31	Sec. 31.3 - 6
Week 14 (12/8, 12/10)	Review for final exam	
Final Exam		Comprehensive Exam Chapters 21 to 31 with emphasis on Chapters 29, 30 and 31

Fall 2021 Academic Calendar

September	1	Wednesday	First Day of Classes
September	4	Saturday	Saturday Classes Begin
September	6	Monday	Labor Day
September	8	Wednesday	Monday Classes Meet
September	8	Wednesday	Last Day to Add/Drop a Class
September	8	Wednesday	Last Day for 100% Refund, Full or Partial Withdrawal
September	9	Thursday	W Grades Posted for Course Withdrawals
September	15	Wednesday	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
September	29	Wednesday	Last Day for 50% Refund, Full Withdrawal
October	20	Wednesday	Last Day for 25% Refund, Full Withdrawal
November	10	Wednesday	Last Day to Withdraw from Classes
November	25	Thursday	Thanksgiving Recess Begins
November	28	Sunday	Thanksgiving Recess Ends
December	10	Friday	Last Day of Classes
December	13	Monday	Reading Day 1
December	14	Tuesday	Reading Day 2
December	15	Wednesday	Final Exams Begin
December	21	Tuesday	Final Exams End
December	23	Thursday	Final Grades Due